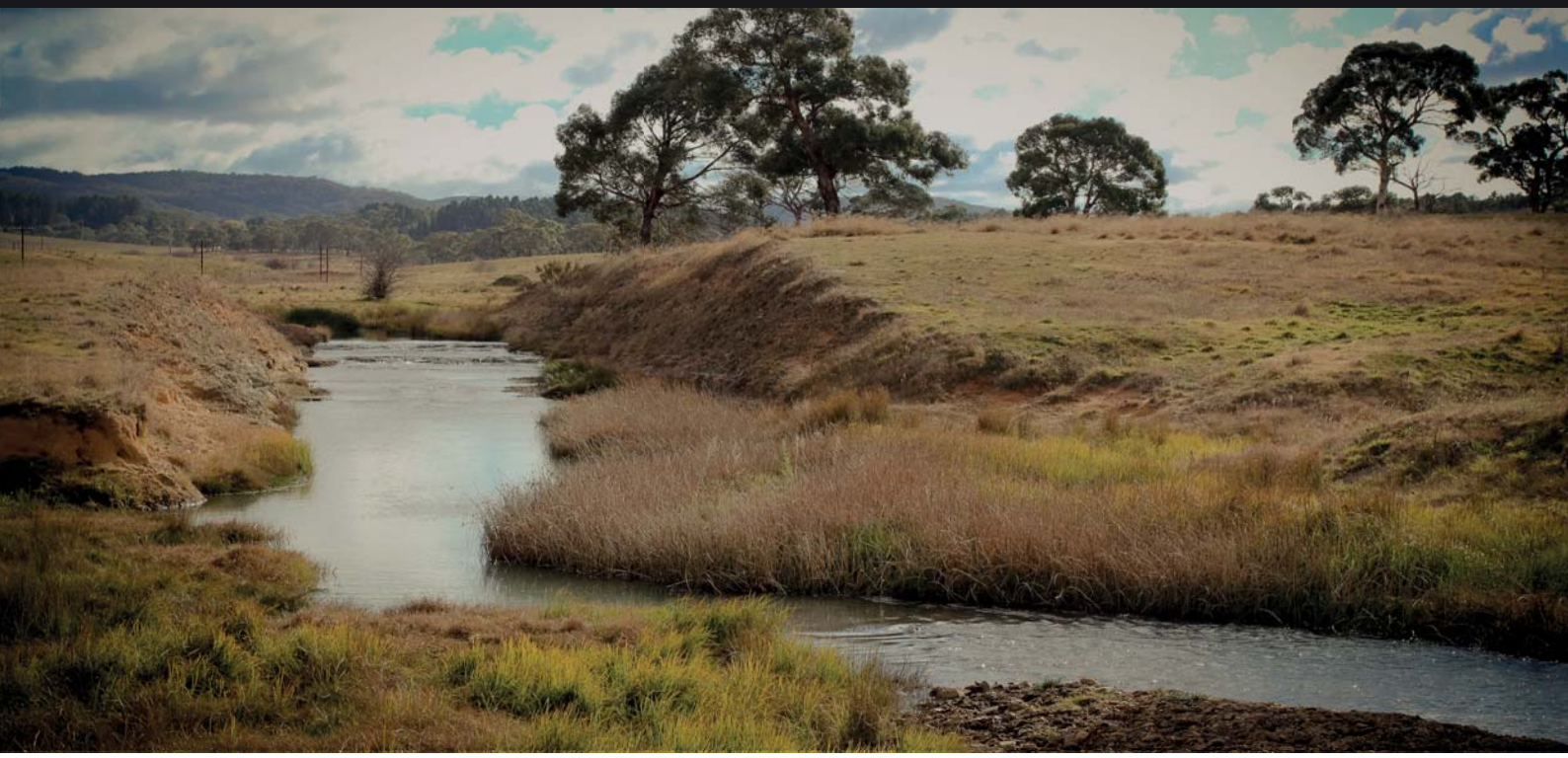
Springvale Water Treatment Project

Modification 1
Statement of Environmental Effects

November 2017



EnergyAustralia

Centennial Coal

Executive summary

The Springvale Water Treatment Project (the project) was approved as State Significant Development (SSD) 7592 by the Planning Assessment Commission on 19 June 2017, under delegation from the Minister for Planning.

The approved project involves the transfer of water from existing dewatering facilities on the Newnes Plateau to a new water treatment plant located at the Mount Piper Power Station (MPPS). Treated water will be used as a priority within the MPPS cooling water system and excess water transferred to Thompsons Creek Reservoir for storage and subsequent reuse in the power station operations.

Springvale Coal Pty Ltd (Springvale Coal) and EnergyAustralia has been progressing the procurement process for delivery of the project. Veolia has been selected as the preferred proponent to complete the detailed design, construction and operation of the project and have developed a design solution involving a number or minor design changes including:

- Alternate brine management process to replace the use the existing brine concentrators at MPPS.
- Revised pond strategy involving the repurposing of the existing MPPS clean water pond and blowdown ponds.
- Incorporation of a hydraulic break tank on the transfer pipeline to assist with the gravity transfer of water to the new water treatment plant.
- Minor re-alignment of the pipeline near Lidsdale in the vicinity of Skelly Road, the Castlereagh Highway and Coxs River to accommodate the use of directional drilling.
- Inclusion of hydraulic standpipe on the residuals transfer pipeline to aid in the hydraulic control of the system.
- An increase in the anticipated construction and operational workforce in comparison to that predicted in the EIS.

Potential environmental impacts arising from the proposed design changes are considered negligible to minor and consistent with the previous assessments undertaken for the project. A summary of potential environmental consequences associated with the proposed design changes is provided in Table ES 1-1.

Table ES 1-1 Environmental consequences

Environmental Aspect	Impact Identification
Soil and Water Resources	The project will continue to operate as a zero discharge system and result in a significant benefit to the drinking water catchment. The modified brine management system will perform equal to or better than the existing operations or the original design proposed as part of the EIS.
Biodiversity	Risk to terrestrial flora and fauna is predominantly in accordance with the assessment in the EIS. Proposed design changes fall within previously disturbed areas or within the disturbance footprint assessed as part of the EIS
Heritage	Risk to Aboriginal and Non-Aboriginal heritage is predominantly in accordance with the assessment in the EIS

Environmental Aspect	Impact Identification
Traffic and transport	Additional vehicle movements will not impact upon the capacity of the local road network
Aquatic ecology	There will be no change to the beneficial water quality outcomes achieved for the project and risks to aquatic ecology is considered largely in accordance with the EIS and DA amendment
Noise and vibration	Additional water pumps at the WTP will not represent a noise source that has potential to contribute to noise emissions from the overall MPPS operations. An increase in vehicle movements is predicted to have negligible impact upon existing road traffic noise on the local road network.
Air quality	Risk to local air quality is considered in accordance with assessment in the EIS
Greenhouse	The modified develop will result in a reduction in greenhouse emissions
Visual	Visual impacts will be largely in accordance with the assessment in the EIS
Waste	The project will result in increased potential for beneficial reuse opportunities for the salts arising from the brine management solution
Socio-economic	The additional workforce will provide increased opportunities for local employment and economic stimulus for the region.

The project will remain substantially the same development as originally approved, however the design modifications introduce changes which are not considered to be “generally in accordance with the development described in the EIS” as required under Condition 2 of Schedule 3 of the consent.

Springvale Coal therefore propose to modify SSD 7592 under Section 96(1A) of the *Environmental Planning and Assessment Act, 1979* to regularise the consent and ensure the preferred design for the project meets the terms of the consent.

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1. Introduction

1.1 Overview

The Springvale Water Treatment Project (the project) was approved as State Significant Development (SSD) 7592 by the Planning Assessment Commission on 19 June 2017, under delegation from the Minister for Planning. Development consent was granted under Section 89E of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) based upon the development described in the Springvale Water Treatment Project Environmental Impact Statement (the EIS), the Response to Submissions and the Amendment to Development Application.

The approved project involves the transfer of water from existing dewatering facilities on the Newnes Plateau to a new water treatment plant located at the Mount Piper Power Station (MPPS). Treated water will be used as a priority within the MPPS cooling water system and excess water transferred to Thompsons Creek Reservoir for storage and subsequent reuse in the power station operations.

Springvale Coal Pty Ltd (Springvale Coal) and EnergyAustralia has been progressing the procurement process for delivery of the project. Veolia has been selected as the preferred proponent to complete the detailed design, construction and operation of the project.

Veolia has developed a preferred design solution that incorporates a number of minor design modifications to improve the operational efficiency and risk profile for the project. The project will remain substantially the same development as the project described in the EIS and will achieve equivalent or superior outcomes for the surrounding environment and receiving water catchment.

The design modifications introduce minor amendments to the approved transfer and treatment system and alters the use of some existing assets at the Mount Piper Power Station (MPPS). The design modifications include:

- Alternate brine management process to replace the use the existing brine concentrators at MPPS.
- Revised pond strategy involving the repurposing of the existing MPPS clean water pond and blowdown ponds.
- Incorporation of a hydraulic break tank on the transfer pipeline to assist with the gravity transfer of water to the new water treatment plant.
- Minor re-alignment of the pipeline near Lidsdale in the vicinity of Skelly Road, the Castlereagh Highway and Coxs River to accommodate the use of directional drilling.
- Inclusion of hydraulic standpipe on the residuals transfer system to aid in the hydraulic control of the system.
- An increase in the anticipated construction and operational workforce in comparison to that predicted in the EIS.

The project will remain substantially the same development as originally approved, however the design modifications introduce changes which are not considered to be “generally in accordance with the development described in the EIS” as required under Condition 2 of Schedule 3 of the consent.

Springvale Coal therefore propose to modify SSD 7592 to regularise the consent and ensure the preferred design for the project meets the terms of the consent.

1.2 Purpose of this report

This statement of environmental effects (SEE) has been prepared to support the application to modify development consent SSD 7592 pursuant to Section 96(1A) of the EP&A Act. The report assesses the potential environmental impacts arising from the modified design solution. The report has been prepared to a level of detail commensurate with the minor scale of the modifications and the minimal potential for environmental impacts associated with the proposed design changes.

1.3 The applicant

Springvale Mine is owned by Centennial Springvale Pty Limited (50%) and Springvale SK Kores Pty Limited (50%) as participants in the Springvale unincorporated joint venture. Springvale Mine is operated by Springvale Coal for and on behalf of the joint venture participants.

Springvale Coal is the applicant of the project for the purposes of the development application.

Springvale Coal are developing the Project in conjunction with Energy Australia who operate the MPPS. The partners are currently progressing commercial arrangements for the delivery and operation of the project by Veolia as an independent operator company.

The relevant postal address for Springvale Coal is:

Springvale Coal Pty Limited
Level 18
1 Market St
Sydney NSW 2000

1.4 Modification approval framework

The Project was approved as State Significant Development (SSD 7592) under Section 89E of the EP&A Act on 19 June 2017. SSD consents may be modified under Section 96 of the EP&A Act provided information stipulated in Clause 115 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) is contained within the application, and that the development as modified will be substantially the same development for which consent was originally granted.

Initial advice from the NSW Department of Planning and Environment (DP&E) has indicated that the appropriate modification pathway for the proposed design changes would be Section 96(1A) relating to modification involving minimal environmental impact.

The requirements of Clause 115 of the EP&A Regulation and where they are addressed in this document are outlined in Table 1-1.

Table 1-1 Requirements for application for modification of development consent

Requirement	Response/reference
(1) An application for modification of a development consent under section 96(1), (1A) or (2) or 96AA (1) of the Act must contain the following information:	
(a) the name and address of the applicant,	Section 1.3
(b) a description of the development to be carried out under the consent (as previously modified),	Section 2.1

Requirement	Response/reference
(c) the address, and formal particulars of title, of the land on which the development is to be carried out,	Section 2.2
(d) a description of the proposed modification to the development consent,	Section 3
(e) a statement that indicates either: (i) that the modification is merely intended to correct a minor error, misdescription or miscalculation, or (ii) that the modification is intended to have some other effect, as specified in the statement,	Section 2.3
(f) a description of the expected impacts of the modification,	Section 4 and 5
(g) an undertaking to the effect that the development (as to be modified) will remain substantially the same as the development that was originally approved,	Section 2.3
(g1) in the case of an application that is accompanied by a biodiversity development assessment report, the reasonable steps taken to obtain the like-for-like biodiversity credits required to be retired under the report to offset the residual impacts on biodiversity values if different biodiversity credits are proposed to be used as offsets in accordance with the variation rules under the Biodiversity Conservation Act 2016,	Not applicable
(h) if the applicant is not the owner of the land, a statement signed by the owner of the land to the effect that the owner consents to the making of the application (except where the application for the consent the subject of the modification was made, or could have been made, without the consent of the owner),	Not applicable – public notification development in accordance with Clause 49(2)(b) of the EP&A Regulation
(i) a statement as to whether the application is being made to the Court (under section 96) or to the consent authority (under section 96AA),	Not applicable - The application is being made to the consent authority under Section 96(1A)

When assessing an application under Section 96 for modification to consent, the consent authority is required to take into consideration the relevant matters outlined in Section 79C of the EP&A Act.

This SEE considers the likely impacts of the development, including environmental impacts on both the natural and built environments and the social and economic impacts in the locality.

The proposed design changes will not alter any aspect of the permissibility or regulatory framework for the project presented in Chapter 6 of the Springvale Water Treatment Project EIS.

2. Existing consent

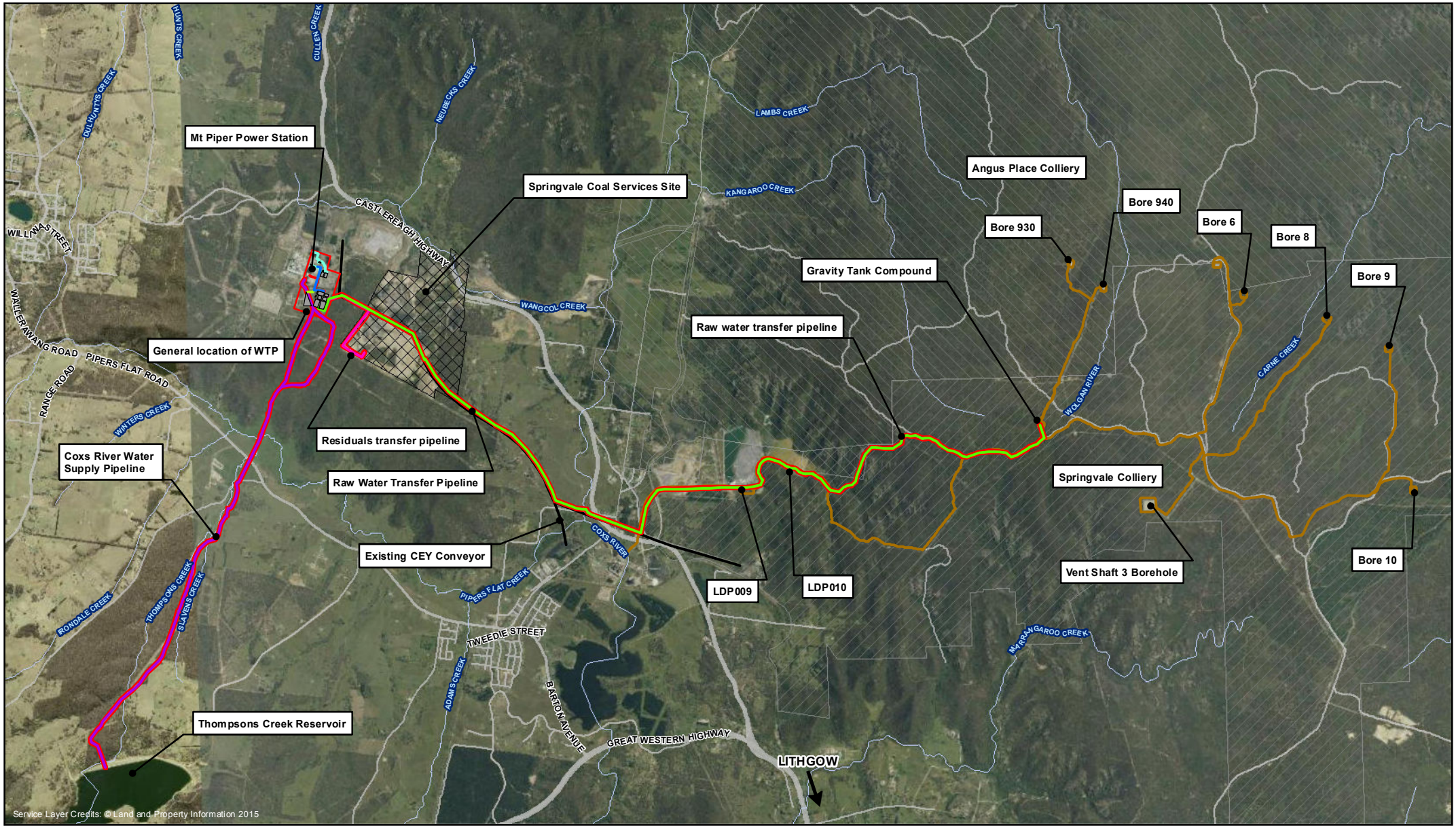
2.1 The approved project

The project involves the transfer of water from existing dewatering facilities on the Newnes Plateau to a new water treatment plant located at MPPS. Treated water will be used as a priority for industrial reuse to meet the demand for make-up water requirements within the MPPS cooling water system. Any excess treated water will be temporarily stored within Thompsons Creek Reservoir for subsequent reuse during periods of high water demand in the MPPS cooling water system. The project comprises the following major elements:

- A system to transfer up to 42 ML/day of dewatered mine water from the existing gravity tank forming part of the approved Springvale Delta Water Transfer Scheme (SDWTS) on the Newnes Plateau to the Mount Piper Power Station (MPPS) site.
- A new water treatment plant at MPPS incorporating desalination processes to reduce the salinity in mine water to a standard suitable for either industrial reuse or environmental release.
- Transfer of treated water from the water treatment plant to the MPPS cooling water system to contribute to the demand for make-up water.
- Treated water pipeline to the lower valve station on the existing Coxs River Water Supply pipeline.
- Use of the existing Coxs River Water Supply pipeline to transfer excess treated water to Thompsons Creek Reservoir for storage and subsequent reuse in the cooling water system.
- Disposal of residuals from the pre-treatment process in the reject emplacement area (REA) at the neighbouring Springvale Coal Services site (part of Western Coal Services Project, SSD 5579).
- Transfer of the saline brine stream to the MPPS cooling water blowdown system for integration with existing treatment and brine disposal practices at the power station.
- Installation of a crystalliser to provide further treatment of the additional salt load generated within the MPPS cooling water blowdown system.

2.2 Site location

The project is located in the western coalfields of NSW near Lithgow. A gravity transfer pipeline will extend from the existing water management infrastructure on the Newnes Plateau approved under the existing Springvale MEP SSD 5594 Consent. The pipeline will transfer mine water from the existing “Gravity Tank” to the MPPS as shown on Figure 2-1.



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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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LEGEND

Proposed Alignment

- Raw water transfer pipeline
- Residuals transfer pipeline
- Brine transfer pipeline
- Crystallised salt transfer pipelines
- Treated water pipeline to cooling tower forebay
- Existing and Approved SDWTS
- Existing CEY Conveyor
- Cox's River Water Supply Pipeline
- Treated water pipeline to Coxs River Water Supply Pipeline
- Proposed WTP Layout
- Project application area (representative)
- Springvale Mine
- Angus Place Colliery
- Springvale Coal Services Site

Centennial Coal and EnergyAustralia
EA/CEY Water Treatment Project

Job Number 21-25109
Revision A
Date 02 Nov 2016

Project Application Area Figure 2.1

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Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: General Topo - NSW LPI DTDB 2012, Imagery - sixmaps 2015. Created by:mking3

From the gravity tank on the Newnes Plateau, the pipeline would initially follow the alignment of existing access trails and a former logging trail over the escarpment to Springvale Mines existing LDP 009 on EPL 3607. The remainder of the pipeline alignment between LDP009 and the MPPS follows existing ash pipelines, haul roads and an overland conveyor system. The pipeline will traverse a number of roads including the Castlereagh Highway, the Coxs River and a private rail spur.

The water treatment plant will be located on the MPPS site to the south of the existing cooling water system.

The existing Coxs River Water Supply pipeline will be used to transfer excess treated water between MPPS and Thompsons Creek Reservoir for storage and subsequent reuse in the power station operations.

The project application area includes a buffer surrounding the proposed water treatment infrastructure at MPPS and 20 m corridor along the proposed pipeline alignments. Land holdings traversed by the Project Application Area are shown in Table 2-1.

Table 2-1 Lot and DP for properties in the Project area

Owner	Lot and DP
Energy Australia NSW Pty Ltd	Lot 191 DP 629212 Lot 101 DP 829410 Lot 2 DP 702619 Lot 15 DP 804929 Lots 3 and 5 DP 829137 Lots 101 and 103 DP 1164619 Lot 1 and 5 DP 1087684 Lot 1 DP 829065 Lot 9 DP 804929
Centennial Springvale Pty Ltd and Springvale SK Kores Pty Ltd	Lot 1 DP 88503 Lot 501 DP 825541 Lot 2 DP 126483 Lot 13 and 357 DP 751651 Lots 2, DP 1151441
Lithgow City Council	Wolgan Road Skelly Road Brays Lane
Ivanhoe Coal Pty Ltd	Lot 2 DP 567915 Lot 101, DP 1137972 Lot 16 DP 751651 Lot 174 DP 751651 Lot 385 and Lot 375 DP 754651
Janette Winifred Hunt (private)	Lot 371 DP 751651
NSW State Forest	Part Lot 502, DP 822541 Lot 3 DP 1151441
RMS	Castlereagh Highway
The Crown	Various paper roads
Existing Cox River Water Supply Pipeline (MPPS to Thompsons Creek Reservoir)	
Energy Australia NSW Pty Ltd	Lot 1 DP 829065 Lot 2 DP 702619 Lot 1 DP 800003 Lot 241 DP 8019151/1183453 Lot 191 DP 629212

Owner	Lot and DP
	Lot 254 DP 806025 Lot 103 DP 1164619
Wayne Alfred Hollands & Lorraine Elsie Hollands	Lot 1 DP 710709 Lot 101 DP 1053026 Lot 102 DP 1053026
Taranza Pty Ltd	Lot 2 DP 874368
The State of New South Wales	Lot 2 DP 1183453 Lot 47 and Lot 91 DP 751638 Lot 502 DP 825541
Alexander William Fraser and Marie Janice McCann	Lot 122 DP 751651
Edward Gerard Eustace & Glenys Joy Wilkinson Eustace	Lot 7 DP 828737
Ivanhoe Coal Pty Ltd	Lots 166, 160, 159, 165 and 164 DP 751638 Lot 1 DP 1151441
Marjon Holdings Ltd	Lot 242 DP 801915
David Jackson Turnbull & Carmel June Turnbull	Lot 123 DP 751651 Lot 1 DP 1176813
Transport for NSW	Lot 2003 DP 1221830

2.3 Need for the modification

Springvale Coal and EnergyAustralia have been progressing the procurement process for delivery of the project. Three companies were initially shortlisted and a preferred proponent was recently selected to complete the detailed design, construction and operation of the project. The contract is proceeding towards formal contract execution and, subsequently, 'financial close' to release proponent funding for the construction.

The preferred proponent, Veolia, has brought a wealth of global and local experience in the development of innovative solutions for similar water treatment and brine management systems. The proponent has developed a preferred design to improve the operational efficiency and reduce the risk profile for the project.

The preferred design introduces minor design modifications and alters the use of some existing assets at the MPPS. The development will remain substantially the same development as the approved project, but will result in minor inconsistencies with the development described in the EIS. A modification to the consent SSD 7592 is therefore proposed to ensure the modified project to be developed by the applicant meets the terms of the consent.

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3. Proposed modification

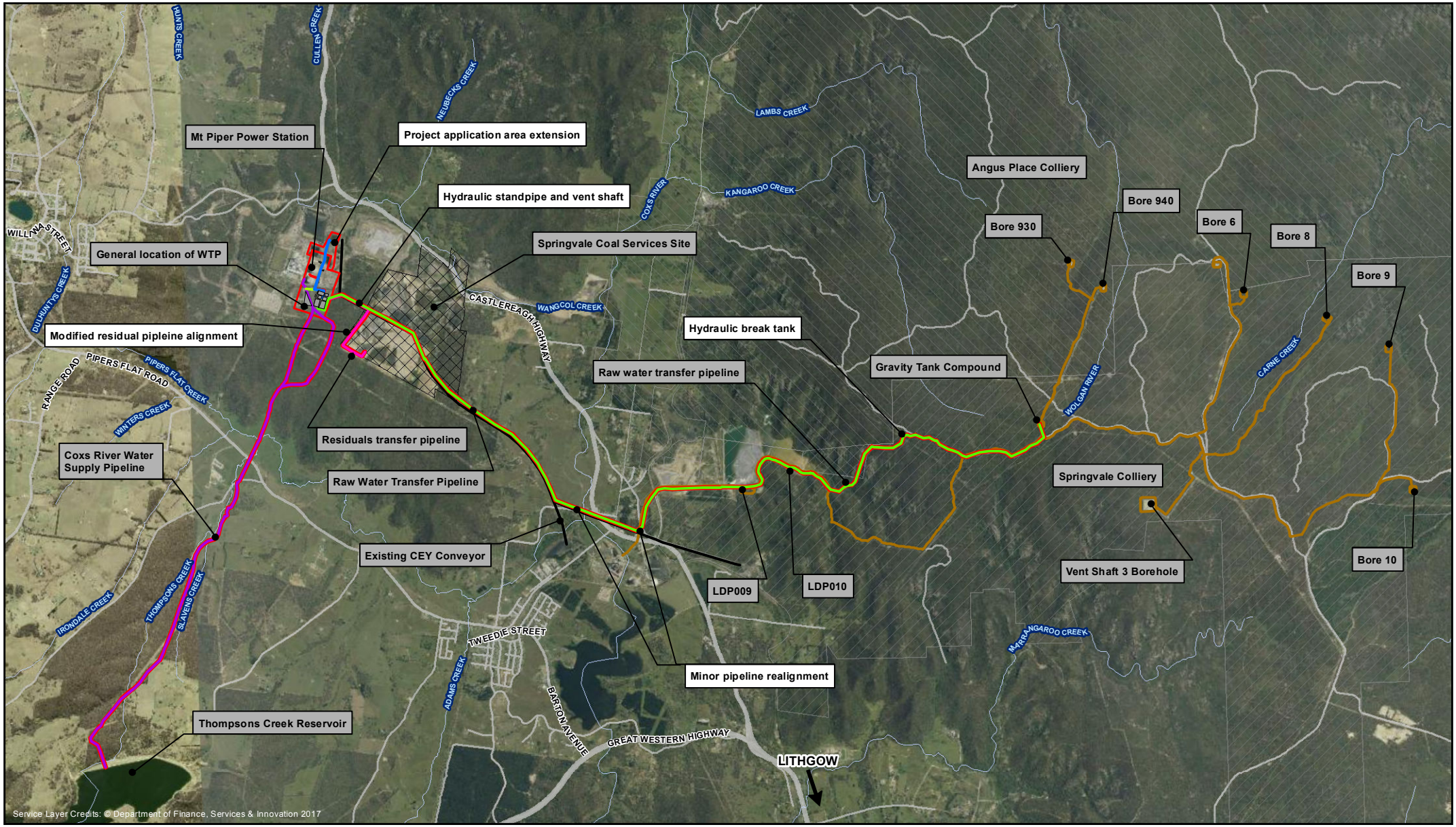
3.1 Overview of proposed changes

The project will remain substantially in accordance with the development as described in the EIS. An outline of key changes proposed to the reference design included in the EIS and consideration of the need for a modification are presented in Table 3-1 and Figure 3-1.

A more detailed description of the proposed design modifications and the rationale for each amendment is outlined in the subsequent sections.

Table 3-1 Project amendments

Development described in EIS	Proposed amendments
Brine management process – brine stream generated by WTP to be directed for treatment within existing MPPS cooling water blowdown system (brine concentrators and MF/RO units) with addition of crystalliser to maintain brine to ash ratios	Implementation of an Optimised Pre-treatment and Unique Separation (OPUS) process including the addition of an additional reverse osmosis system to replace the use of the brine concentrators and manage salt load from the new water treatment plant (WTP)
Pond strategy – buffer pond/s with capacity of 72 ML to allow buffering of minor flow and chemistry fluctuations prior to treatment and salt slurry ponds to receive output from crystalliser	Re-purposing existing MPPS clean water and blowdown ponds for storage of treated and untreated water within the treatment process and remove the need for buffer pond and salt slurry pond
Transfer pipeline hydraulics – pipeline proposed to include a range of ancillary infrastructure including air valves and vent stacks as required for compliant hydraulic operation of the pipeline	Transfer system proposed to incorporate a hydraulic break tank at the top of the escarpment to minimise pumping requirements and allow gravity transfer to MPPS
Pipeline alignment – the reference design included a sharp right hand bend on approach to the coal conveyer and a kink in the transfer pipeline alignment to accommodate traversing infrastructure and natural features including the Coxs River, Castlereagh Highway, Brays Lane and the railway line.	Proponent proposed to traverse the Coxs River, roads and railway utilising directional drilling, resulting in a more direct pipeline alignment and eliminating a sharp right hand bend and the kink in the project application area
Residuals transfer system – the pipeline system to transfer residuals from the WTP to the Springvale Coal Services site did not specifically reference the need for ancillary infrastructure and will extend through a recently constructed tailings dam within the footprint of the REA	Hydraulic standpipe is proposed for the residuals pipeline to provide hydraulic control to the transfer system and a slight deviation to the pipeline alignment is proposed to avoid the new REA
Workforce - the project would create direct employment opportunities including up to 50 Full Time Equivalent (FTE) positions expected to be generated during construction and around 5 FTE during operations.	The peak workforce during construction would be 120 workers and an operational workforce of 22 FTE would be implemented for the operation of the facility.



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LEGEND

Proposed Alignment

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- Treated water pipeline to Coxs River Water Supply Pipeline
- Proposed WTP Layout
- Project application area (representative)
- Springvale Mine
- Angus Place Colliery
- Springvale Coal Services Site

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EA/CEY Water Treatment Project

Job Number 21-25109
Revision A
Date 10 Nov 2017

Modified Project Application Area

Figure 3.1

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Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: General Topo - NSW LPI DTDB 2012, Imagery - sixmaps 2015. Created by:mking3

3.2 Brine management process

3.2.1 EIS Reference design

The EIS described that the brine stream generated as a by-product of the desalination process would be directed to the existing MPPS cooling water blowdown system for further treatment and processing at a rate of approximately 4 to 5 ML/day.

Blowdown water from the existing MPPS cooling water circuit is currently treated within the existing desalination facilities, which include brine concentrators and microfiltration / reverse osmosis (MF/RO) units. The existing desalination infrastructure was proposed to be maintained as part of the project. This would require a minor upgrade to the brine concentrators to facilitate a seed recycle stream to accommodate the higher total dissolved solids generated by the water treatment plant's brine stream.

The additional salt load added to the existing cooling water blowdown system was anticipated to result in a concentrated brine stream from the blowdown system in the order of 11-80 ML/year. A new crystalliser was therefore included as part of the project, in order to reduce brine volumes to between 4.5 and 32 ML/year and maintain existing brine to ash ratios.

The brine concentrate produced by the crystalliser would form a crystallised slurry that would be stored in new dedicated crystallised salt ponds prior to disposal on site at MPPS in the approved brine ash placement area.

3.2.2 Proposed amendments

The preferred design includes the implementation of an OPUS system, incorporating an additional reverse osmosis (RO) system to replace the use of the existing brine concentrators within the MPPS blowdown management system.

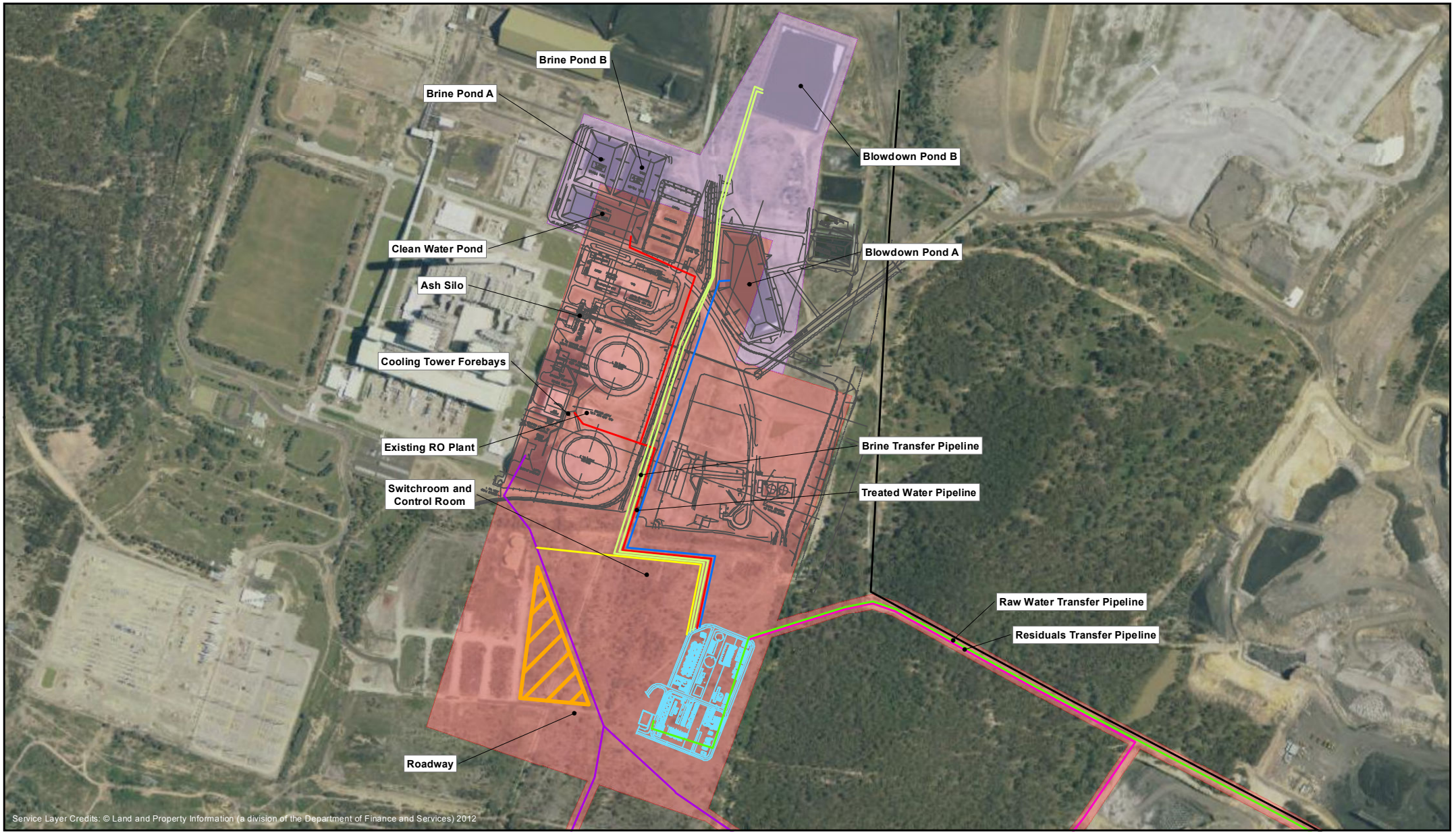
The OPUS system will be located within the overall WTP facility footprint to the south and east of the MPPS operations. The footprint of the new treatment units falls within the project application area which has been assessed as part of the EIS as shown on Figure 3-2.

The brine stream from the new WTP, will be directed to the OPUS feed pond (repurposed Blowdown Pond A) on a continuous basis and combined with the brine stream from the existing MPPS blowdown system MF/RO units.

The combined brine stream would form the basis of the feed for the OPUS system, that incorporates lime softening, media filtration, ion exchange, cartridge filtration and RO units. The permeate (treated water) would be returned to the Clean Water Pond for use in the cooling water system and the RO concentrate (brine stream) will be transferred to either the crystalliser feed tank or to the existing Brine Ponds A and B for ash conditioning in accordance with existing practices (refer Figure 3-2). All internal pipeline connections will be located within the project application area and the MPPS operational footprint and subject to final survey and design.

The OPUS system produces a brine product that is well suited to crystallisation and would allow the crystalliser to operate as a zero liquid waste system. The crystalliser is proposed to be co-located with the OPUS system within the WTP footprint rather than with the salt slurry ponds adjacent to the existing MPPS operational area proposed as part of the reference design for the EIS.

The OPUS system produces a mixed salt and a dewatered lime salt, which will be disposed of with the brine stream in the approved MPPS ash placement area.



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LEGEND

Proposed Alignment
- Raw water transfer pipeline
- Residuals transfer pipeline
- Brine transfer pipeline
- Treated water pipeline
- Raw water buffer transfer pipeline
- Cox's River Water Supply Pipeline
- Treated water pipeline to Coxs River Water Supply Pipeline
- Existing CEY Conveyor
- Project application area
- Project application area extension
- Contractor laydown area
- Existing site facilities
- Proposed WTP layout

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Proposed Water Treatment System Layout

Figure 3.2

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Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: General Topo - NSW LPI DTDB 2012, Imagery - sixmaps 2015. Created by:mking3

3.2.4 Need for the amendment

The proposed OPUS system will reduce the operational risk associated with the use of the existing brine concentrators. RO systems have become widely adopted since the installation of the brine concentrators at MPPS and use physical membranes to concentrate the brine rather than a thermal process used in the existing brine concentrators.

The brine concentrators are an older technology and would need to be operated at close to full capacity to accommodate the additional salt load generated by the WTP. Under the modified project, the brine concentrators will be taken offline and retained for emergency cooling water blowdown treatment, if required by EnergyAustralia.

The modified brine management approach is considered to have several other advantages including:

- The OPUS system is a more sustainable option with a reduction in the required chemical dosing and energy consumption in comparison to the brine concentrators. Annual power consumption has been estimated to reduce from around 25 to 5 GWh/year for the operation of the brine management system.
- The OPUS system produces a mixed salt and a dewatered lime salt, both of which have beneficial reuse applications. The salts will initially be disposed of with the brine in the existing ash repositories and reuse opportunities will be continue to be investigated during the implementation of the project to reduce waste volumes.
- Operation of the crystalliser as a zero liquid waste system avoids the need for the new salt slurry ponds within the MPPS site. This will remove potential risks during construction and operation of the ponds including potential for discharge from the ponds to surface or groundwater resources.
- The footprint of the new treatment units will integrate with the other proposed water treatment infrastructure resulting in a more consolidated and compact design. The disturbance footprint for the OPUS system falls within the project application area presented in the EIS and there will be no potential for increased disturbance to biodiversity of heritage values.
- There will be no change to the water quality achieved for the project or the overall benefit to the catchment.

3.3 Pond strategy

3.3.1 EIS Reference design

The EIS described that mine water from the transfer pipeline would enter a new buffer pond via a cascading aerator at the water treatment plant site. The pond would have capacity of 72 ML to allow for buffering of minor water flow and chemistry fluctuations and was likely to be configured as two 36 ML ponds. The water would then enter a clarification (solids removal) step prior to desalination.

The buffer ponds were also available to provide approximately two days storage to manage water during water treatment plant maintenance activities.

Treated water in excess of MPPS cooling water make-up requirements was proposed to be pumped directly to Thompsons Creek Reservoir for storage and subsequent reuse.

3.3.2 Proposed amendments

The preferred design incorporates a pond strategy, which involves repurposing a number of existing ponds at the MPPS to integrate with the design of the WTP.

Treated water in excess of the immediate MPPS cooling water system make-up water requirements will be sent to the Clean Water Pond shown on Figure 3-2. The Clean Water Pond will also receive permeate (treated water) from the new OPUS treatment units and be used to provide a buffering capacity for intra-day make-up water requirements. The intra-day buffering capacity will reduce the volume of treated water that is pumped to Thompsons Creek Reservoir for storage and reuse, minimising pumping costs and energy consumption.

The preferred design also eliminates the use of flow through ponds at the commencement of the treatment process and instead provides for a buffer pond to run in parallel to the water treatment process. The modified brine management process (described above) would reduce the need for large blowdown water emergency storages currently in place at MPPS, and would allow the existing storages to be used as part of the proposed water treatment process.

The proposed design involves re-purposing of the existing MPPS Blowdown Pond B (refer Figure 3-2) to function as a buffer storage for the water treatment plant. Incoming mine water will typically flow directly to the clarifiers as part of the water treatment process. A hydraulic standpipe will be configured to allow the flow to be split between the clarifiers and the buffer storage located at Blowdown Pond B. Any overflows from the clarifiers, filters and filtered water tank will also be diverted directly to the buffer pond. Water temporarily stored in the buffer pond will be pumped back to the transfer pipeline for subsequent treatment when capacity is available in the treatment system. Blowdown Pond B has a capacity of 103 ML, which provides additional capacity in comparison to the 72 ML buffer ponds proposed as part of the EIS.

Blowdown Pond A will also be re-purposed as part of the modified project. The WTP RO brine stream and the existing MPPS blowdown RO system brine stream will be directed to Blowdown Pond A (refer Figure 3-2). This pond would form the feed stream for the new OPUS wet brine deconcentration system.

Blowdown Pond B and a portion of Blowdown Pond A and the Clean Water Pond would be located outside the defined project application area in the EIS. Inclusion of the ponds within the water treatment process and the indicative internal pipeline connections will require an extension to the project application area within the existing MPPS operational footprint by approximately 10.6 ha as shown on Figure 3-2.

3.3.3 Need for the amendment

The use of existing storages as part of the proposed water treatment process is considered to provide a number of advantages in comparison to the reference design presented in the EIS including:

- The ponds are existing and require minimal modification to retrofit for the proposed applications. Pipelines to connect the pond system to the water treatment plant will be located within previously disturbed areas within the MPPS operational footprint.
- Avoids ground disturbance, geotechnical and mine subsidence risks associated with the construction of large ponds at the inlet to the WTP and allows the most stable areas at the site to be used for the proposed water treatment infrastructure.
- Operating the buffer pond in parallel to the treatment process reduces the requirements to dry and dewater the sludge that would accumulate within a flow through system and reduces the potential for algal blooms in the ponds to adversely affect the treatment process and subsequent water quality.

- Proposed buffer storage provides greater capacity and storage volume than proposed in the EIS.
- Provides energy saving in pumping costs by allowing mine water from the transfer pipeline to be passed directly to the treatment units and limits the volume of treated water required to be pumped to Thompsons Creek Reservoir.
- Variable speed drive pumps used to return water from the buffer storage to the water treatment plant will not represent and noise source that has potential to contribute to noise emissions from the MPPS operations.

3.4 Transfer pipeline hydraulics

3.4.1 EIS Reference Design

The EIS described the transfer pipeline for the project to transfer water from the existing gravity tank on the Newnes Plateau to the MPPS. The description of the pipeline included an allowance for related pipeline infrastructure required as part of the transfer system to include:

- Air valves and vent stacks as required for compliant hydraulic operation of the pipeline.
- Scour valves.
- Intermediate in-line valves for practical sectional isolation during maintenance or emergency.
- Intermediate in-line control valves for compliant hydraulic operation and shut-down.
- Fire service tapping points (branch, isolation valve and hose couplings) were also proposed to be installed at a number of locations.

3.4.2 Proposed amendments

The Proponents design includes the provision for a hydraulic break tank at the top of the escarpment as shown on Figure 3-1.

The break tank control structure will comprise a tank of around 3 square metre by 2 metre deep and will be installed underground entirely within the project application area and disturbance footprint described in the EIS. The tank will be installed adjacent to the existing transmission line alignment and will be more than 500 metres away from the sensitive pagoda formations known as the Clerestory Spurs.

Mine water will be initially pumped from the gravity tank to the new break tank and then allowed to flow via gravity for the remainder of the alignment to MPPS. The break tank will prevent surge pressures from the pumps travelling along the transfer pipeline from escarpment.

3.4.3 Need for the amendment

The EIS project description did not specifically include a hydraulic break tank as part of the ancillary infrastructure required for the operation of the transfer pipeline. Installation of a break tank will have the following advantages:

- Provide hydraulic separation between the pumped and gravity sections of the transfer pipeline.
- Reduce the risk of pipeline failure or leaks along the majority of the pipeline alignment.

3.5 Transfer pipeline alignment

3.5.1 EIS Reference Design

The raw water transfer pipeline alignment presented in the EIS included a sharp right hand bend where the alignment met the existing overland conveyor system to MPPS.

The raw water transfer pipeline alignment also included a kink in the vicinity of the Coxs River to accommodate potential alternate construction methods to traverse road, rail and riverine corridors. This would allow roads to traversed either by trenching or directional drilling perpendicular to their alignment to minimise disturbance with final construction methods to be determined by the construction contractor. Directional drilling was committed to as part of the submissions response for crossing Coxs River.

The project application area described in the EIS includes a 20 m corridor along the pipeline alignments (10 metres either side of the centre of each pipeline) along the length of the pipeline alignment.

3.5.2 Proposed amendments

The construction methodology for the preferred design will utilise horizontal directional drilling to result in a more direct pipeline alignment. This will result in a slight modification to the approved project application area.

An approximate 100 metre direction drilling run will cut the corner of the pipeline alignment proposed as part of the EIS and eliminate the sharp right angle bend in the pipeline as shown on Figure 3-3. The direction drill will traverse under Skelly Road and avoid existing services on approach to the existing conveyor.

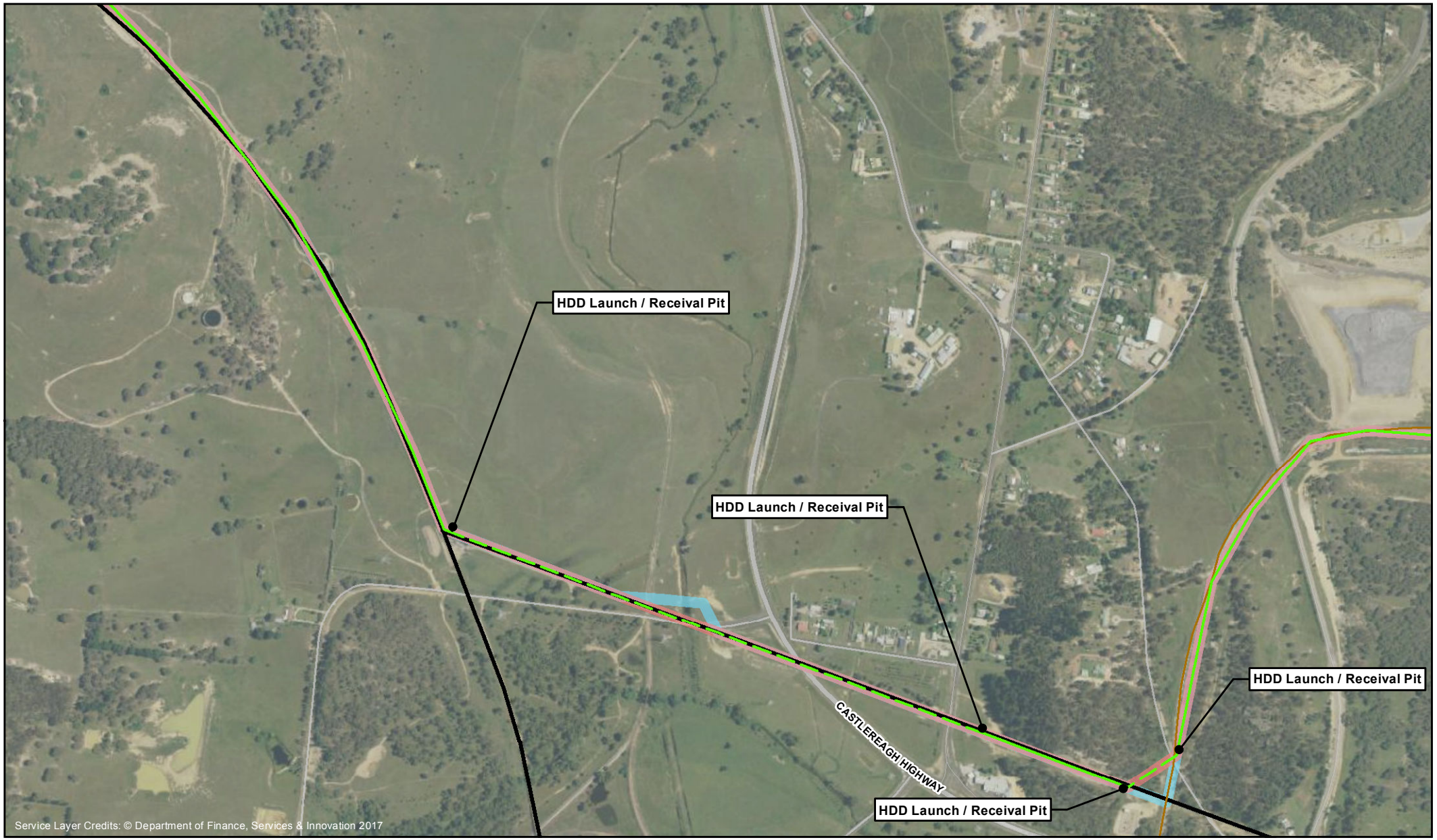
The construction methodology also includes an approximate one kilometre directional drill to traverse the Wolgan Road, Castlereagh Highway, Brays Lane, the railway corridor and the Coxs River. This will result in a more direct alignment by eliminating the former kink (refer Figure 3-3) in the pipeline alignment presented in the reference design as part of the EIS.

Directional drilling requires the excavation of launch and receival pits on either side of the length of pipeline to be installed. The pits would be established in cleared areas within the approved disturbance footprint along the pipeline alignment. The directional drill would be launched from one pit and the drill head would be driven horizontally using lengths of drilling rods which are continually added as required for the length of the drilled section. At completion of the bore, the drilling head would enter the receival pit and the new pipeline will be pulled back through the bored section. There will be no disturbance to the surface of the ground for the length of the drilled section between the launch and receival pits.

3.5.3 Need for the amendment

The project application area will be modified to follow the more direct pipeline alignment and is considered to have the following advantages over the reference design:

- Improved hydraulic performance of the water transfer system.
- The pipeline will be installed underground with no physical disturbance to the ground surface outside the project application area assessed as part of the EIS.
- The launch and receival pits will be located in previously cleared areas within the existing project application area and disturbance footprint assessed as part of the EIS.
- The pipeline will be installed underground and will not result in any disruption to the local road network or rail operations.



Paper Size A4

0 75 150 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

Proposed Alignment

- Raw water transfer pipeline
- Raw water transfer pipeline (bored segment)
- Existing and Approved SDWTS
- Existing CEY Conveyor
- Project application area (proposed)
- Project application area (approved)

Centennial Coal and EnergyAustralia
EA/CEY Water Treatment Project

Raw Water Transfer Pipeline Alignment

Job Number 21-25109
Revision A
Date 03 Nov 2017

Figure 3.3

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Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: General Topo - NSW LPI DTDB 2012, Imagery - sixmaps 2015. Created by:mking3

3.6 Residuals transfer system

3.6.1 EIS Reference design

A description of the proposed residuals transfer pipeline was included in Section 5.2.4 of the EIS and included the installation of a pipeline approximately 1800 metres in length, commencing at the residuals pumping station outlet to an open end of pipe laid over the bank of the REA at the Springvale Coal Services site. The transfer pipeline would be designed to be capable of transferring residuals at a flow rate of 30 L/s in batch flow periods.

Ancillary infrastructure such as air valves and vent stacks were described for the operation of the main transfer pipeline but were not specifically referenced in the description of the residuals transfer pipeline.

3.6.2 Proposed amendments

The preferred proponents design includes a hydraulic standpipe on the residuals pipeline to aid the hydraulic operation of the pipeline. The hydraulic standpipe would include a vent shaft located on the crest of the hill immediately adjacent to the coal conveyor on the Springvale Coal Services site.

A small diversion to the pipeline alignment will also be required to allow the pipeline to skirt the boundary of a tailings dam recently constructed within the REA for the Springvale Coal Services site as part of Western Coal Services Project, SSD 5579.

The pipeline will be trenched in previously disturbed terrain along the edge of an internal haul road extending around the REA. The modified alignment will not result in any additional clearance of vegetation and will avoid known Aboriginal sites located within 30 metres of the project application area.

Figure 3-4 Residual transfer alignment

Source: CEH Survey

3.6.3 Need for the amendment

The design changes are required for efficient pipeline operation and have the following advantages:

- Hydraulic standpipe is ancillary infrastructure required to provide ventilation and assist with hydraulic control during batch flow transfers within the pipeline.
- The standpipe will be located within the existing project application area, which includes a 20 m corridor along the pipeline alignment.
- The standpipe and vent shaft will be located on the Springvale Coal Service site and will be visually integrated with the conveyor and other mining and power generation infrastructure.
- The minor deviation to the alignment will traverse around the boundary of the tailings dam within the REA.

3.7 Workforce

3.7.1 EIS reference design

The EIS described the workforce required for the construction of the project as fluctuating depending on the construction activities and was predicted to peak at approximately 50 full-time equivalent (FTE) workers, with 20 FTE workers expected for the pipeline construction and a further 30 FTE workers for the water treatment plant construction.

The Project was also expected to employ a workforce of approximately 5 full-time equivalent employees during operation.

3.7.2 Proposed amendment

Veolia has undertaken detailed construction planning during the development of the preferred design and have advised that a peak workforce of up to 80 people will be required for the construction of the water treatment facility. The construction workforce will also comprise up to 40 workers required for the installation of the transfer pipelines, which would operate in a number of crews spread out along the alignment.

A workforce of 22 FTE personnel would be required for the operation of the facility.

3.7.3 Need for the amendment

The EIS considered the anticipated construction and operational workforce based upon the extent of construction and operational planning available at the time of submission.

Veolia in conjunction with their construction partners Abergeldie has undertaken detailed planning in development of the preferred design and has identified a larger workforce than originally predicted.

The elevated workforce numbers is partly a reflection of the accelerated delivery program required to achieve the Springvale Mine Extension Project SSD consent conditions for discharge water quality in relation to salinity of 500 µS/cm EC (90%ile) by 30 June 2019.

4. Environmental risk screening

4.1 Purpose

An environmental risk screening was undertaken to identify potential environmental impacts that may arise as a result of the proposed modification to the development application beyond those identified in the EIS and DA Amendment. The assessment was undertaken to broadly assess the potential environmental risks that may arise as a result out of the proposed amendment and to identify any areas requiring further detailed assessment.

The environmental risk screening for the project involved:

- Identifying environmental aspects
- Identifying the source of potential risks associated with each of these aspects
- Identifying the potential impact associated with each risk
- Identifying any further assessment requirements needed to quantify the extent of impacts associated with the proposed modification

4.2 Risk Screening

Table 4-1 provides the environmental risk screening for the modification and includes:

- A summary of the potential key impacts/risks
- Consideration of the priority for the assessment

Table 4-1 Preliminary environmental risk screening results

Environmental aspect	Source of risk	Potential impact	Risk rating
Soil and water resources	OPUS system for brine management and disposal of mixed salt and dewatered salt at the approved MPPS ash placement area	Leaching of brine and salt blend from the ash repository	Minor
	Change to pond strategy	Re-purposed existing MPPS ponds to provide additional buffer pond capacity and reduce volume of treated water required to be pumped to Thompsons Creek Reservoir	Negligible
	Disturbance resulting from installation of the modified pipeline alignment at Coxs River	Risk of soil disturbance during pipeline installation is in accordance with the assessment in the EIS	Negligible
Biodiversity	Disturbance resulting from installation of proposed new infrastructure and modified pipeline alignment at Coxs River	Risk to terrestrial flora and fauna is predominantly in accordance with the assessment in the EIS. Design changes fall within previously disturbed areas or within the disturbance footprint assessed within the EIS	Negligible
Aquatic Ecology	Proposed modifications altering water quality in the catchment	Risk to aquatic ecology is in accordance with the assessment in the EIS and DA amendment	Negligible
Air quality	Dust emissions during construction of proposed new infrastructure and modified pipeline alignment at Coxs River	Risk to local air quality is considered in accordance with assessment in the EIS	Negligible
Noise and vibration	Pumps required to transfer water between ponds or alternate construction resulting in additional noise emissions	Noise generated from proposed modifications impacting upon surrounding receivers	Negligible
Greenhouse	Reduction in power consumption for the OPUS system and reduced power consumption from reduced pumping associated with the revised pond strategy.	Reduction in greenhouse gas emissions	Positive

Environmental aspect	Source of risk	Potential impact	Risk rating
Heritage	Disturbance resulting from installation of proposed new infrastructure and modified pipeline alignment at Coxs River	Risk to Aboriginal and Non-Aboriginal heritage is in accordance with the assessment in the EIS	Minor
Traffic and transport	Increased construction and operational workforce	Additional vehicle movements required on local road network.	Minor
Visual	Installation of new treatment units and ancillary infrastructure	Visual impacts are largely in accordance with the assessment in the EIS	Negligible
Waste	Altered brine composition from the revised brine management process	Beneficial reuse opportunities for mixed and lime salts	Negligible
Socio-economic	Proposed change to the construction and operational workforce numbers	Additional employment opportunities and associated flow-on economic benefits	Positive

4.1 Priority for assessment

Based upon the results of the environmental risk screening, the following broad qualitative risk ratings were assigned for each environmental aspect.

- High – nil
- Minor – soil and water resources, heritage and traffic and transport
- Negligible – biodiversity, air quality, noise and vibration, waste management, aquatic ecology
- Positive – greenhouse emissions and socio-economics

The design changes represent a minimal departure from the approved project and environmental impacts are predicted to remain generally in accordance with the EIS. More detailed consideration of environmental impacts is provided in the following section, with the level of assessment commensurate with the level of risk associated with the design changes.

5. Environmental assessment

5.1 Soil and water resources

5.1.1 Environmental setting

The project is located in the Upper Coxs River catchment including Wangcol Creek, Sawyers Swamp Creek and the Coxs River within the broader Hawkesbury Nepean Catchment. Flow in the upper Coxs River is regulated by three reservoirs including Lake Wallace, Thompsons Creek Reservoir and Lake Lyell and eventually flows to Lake Burragorang forming part of Sydney's drinking water catchment.

The overall objective of the project is to improve environmental outcomes for the Upper Coxs River catchment through the treatment and reuse of underground mine water at the MPPS. The water management system for the project was developed to maximise the direct reuse of mine water within the MPPS cooling water system and to temporarily store any excess water within Thompsons Creek Reservoir for subsequent reuse.

Bi-products from the treatment process include a residuals stream and a brine stream. The residuals stream will be disposed of within the nearby Springvale Coal Services site reject emplacement area and brine will be used to condition ash in the MPPS ash placement areas in accordance with existing site practices.

The existing ash storages at MPPS are authorised via a number of existing MPPS ash emplacement consents and major project approvals that are independent from the project. The respective consents include provisions for the placement of brine conditioned ash within designated areas and are designed to ensure that the ash conditioned brine (including any brine solids which settle out of the brine holding ponds) is essentially immobilised so that no leaching will occur from the ash placement areas.

The continued disposal of brine and brine solids (which settle out of the brine holding ponds) generated by the project in the approved ash placement areas was determined to be in accordance with the existing consent requirements for the MPPS operations. The proposed minor modifications to the brine management process for the project will continue to provide for brine to be disposed of within the ash placement areas in accordance with existing practices and consents.

The existing MPPS consents require brine conditioned ash to be placed above a base layer of mine overburden and a layer of water conditioned ash within the emplacement area. Brine conditioned ash is placed in 500 mm lifts above a level of 946 m AHD and treated to achieve a compaction of 95% relative to maximum standard compaction through machine compaction and controlled addition of water. The brine solution is effectively immobilised within the compacted ash matrix and is placed a minimum of 35 to 40 metres above the typical groundwater levels which restricts the potential for leaching of brine or salts to the underlying groundwater resources. Ongoing environmental monitoring and adaptive management controls are required as a part of the existing ash placement operations in accordance with the terms of the respective consents.

5.1.2 Impact identification

The project is considered to provide an overall environmental benefit to Sydney's drinking water catchment and the potential impacts have been investigated in detail as part of the EIS.

The proposed design modifications will not alter the water quality outcomes achieved for the project or the overall benefit for the catchment. Consideration of the potential for environmental impacts associated with each of the design changes in comparison to the approved development is outlined below.

Brine Management Process

The OPUS system will integrate with the existing blowdown management system at MPPS and result in the production of the liquid brine stream together with a mixed salt and a dewatered lime salt. The brine stream products will continue to be disposed of in the approved ash placement areas for MPPS in accordance with the existing consents.

Laboratory analysis has been carried out to assess the potential for the proposed mixed salt and lime salt blend from the OPUS system to leach from the ash repository. Column tests were used to provide a comparison of the leachability of the brine conditioned ash under existing operational conditions in comparison to the crystallised salt slurry described in the EIS and the brine and salt mix proposed in the preferred design. The accelerated nature of the laboratory testing (2 days compared to months or years in the repository) with a standardised level of compaction, mean that the tests remain a relative comparison between the designs rather than absolute measures of on-site performance.

The existing operational conditions at MPPS resulted in the highest volume of leachate generated and had the highest hydraulic conductivity of all the samples, closely followed by the reference design presented in the EIS. The alternative OPUS system resulted in the lowest leachate production and hydraulic conductivity.

The total mass of total dissolved solids that leached from the column tests indicted the proposed OPUS system would perform equally or better than the EIS reference design and included:

- EIS Reference Design (10% Salt Conditioned Ash) 5,234 mg
- EIS Reference Design (20% Salt Conditioned Ash) 4,222 mg
- Alternative OPUS Design (20% Salt Conditioned Ash) 4,222 mg
- Alternative OPUS Design (10% Salt Conditioned Ash) 4,139 mg

Compaction tests were undertaken to determine the relative level of compaction that could be achieved by the alternative designs. The results indicate that mixing of the lime and mixed salts with the ash prior to conditioning with brine provides a more homogenous and stable mixture allowing a greater level of compaction than by brine conditioning the ash alone. The results indicate that the optimum moisture content for the salt and ash mixture is around 20% to achieve a maximum dry density of around 1.45 t/m^3. In comparison, the optimum moisture content for conditioning of ash alone was 22% and achieved a maximum dry density of 1.36 t/m^3. The increased degree of compaction achieved through the implementation of the OPUS system will further limit the potential for leaching of salts from the ash repository.

The potential for impacts to surface and groundwater resources associated with brine and salt placement in the ash repositories will be further investigated as part of the Brine and Residual Waste Disposal plan in accordance with Condition 5 of Schedule 3 of consent (SSD 7592) and the ongoing requirements of the existing ash placement consents.

The design change will also eliminate the need for new salt slurry ponds to be established on the MPPS site. This will eliminate potential risks during construction and operation of the ponds including potential for discharge or overflow from the ponds to surface or groundwater resources.

Pond Strategy

The preferred design incorporates a pond strategy that involves repurposing a number of existing ponds at the MPPS to integrate with the design of the WTP. The ponds are existing and require minimal modification to retrofit for the proposed applications.

The strategy avoids ground disturbance, geotechnical and mine subsidence risks associated with the construction of new purpose built buffer storage ponds and allows the most stable areas at the site to be used for the water treatment infrastructure. The pipeline to transfer water to existing ponds will be located within the active operational areas at the power station and will not result in increased potential for erosion of sediment laden run-off from the work area.

Operating the buffer pond in parallel to the treatment process reduces the requirements to dry and dewater the sludge that would accumulate within a flow through system and reduces the potential for algal blooms in the ponds to adversely affect the treatment process and subsequent water quality.

The proposed buffer storage provides capacity of 103 ML, which is greater than the 72 ML buffer storage volume than proposed in the EIS providing additional contingency and buffer capacity into the system. Water temporarily stored in the buffer pond will be pumped back to the WTP for subsequent treatment when capacity is available.

Transfer pipeline hydraulics

A break tank is required to be installed at the top of the escarpment to assist with hydraulic control of the pipeline. The break tanks will be installed entirely within the disturbance footprint assessed within the EIS and appropriate erosion and sediment controls in accordance with the current approval conditions will limit the potential for erosion and sediment laden run-off from the work area.

Installation of the break tank will reduce the risk of pipeline failure or leaks along the transfer pipeline and the associated risk of spillage of untreated mine water.

Pipeline alignment

New sections of transfer pipeline will be installed underground within a directional bore and there will be no physical disturbance to the ground surface outside the project application area assessed as part of the EIS.

The directional drilling operation will be used to pass beneath the Coxs River resulting in minimal potential for impacts upon stream geomorphology. Geotechnical analysis indicates substantial outcropping of sandstone bedrock on the bed and backs of the river in the vicinity of the crossing and indicates the site is feasible for implementation of directional drilling.

Residuals transfer system

The hydraulic standpipe and vent shaft will be installed entirely within the disturbance footprint assessed within the EIS and the diversion of the residuals pipeline will be restricted to previously disturbed land immediately adjacent to the REA.

Appropriate construction management will limit the potential for erosion and sediment laden run-off from the work area

Workforce

There is considered to be minimal potential for impacts to soil and water resources associated with the predicted increase in construction and operational workforce.

5.2 Biodiversity

5.2.1 Environmental setting

The project application area extends from relatively intact native vegetation on the Newnes Plateau to lower lying vegetated and disturbed lands along the transfer pipeline to MPPS. The eastern portion of the project application area is located within the Newnes State Forest, which is connected to protected areas including Gardens of Stone National Park and Wollemi National Park to the north, Blue Mountains National Park to the east and Ben Bullen State Forest to the north-west. The western half of the project application area is situated predominantly on disturbed lands due to existing farming, roads, easements and mining operations. The WTP is proposed to be established on previously disturbed land on the MPPS site.

Detailed biodiversity reports completed as part of the EIS (RPS, 2016a) indicate there were 15 vegetation types identified within the project application area for the EIS and presented in Table 5-1. Mapping units (MU) are in accordance with DEC (2006a) vegetation mapping.

Table 5-1 Vegetation within the Project application area

Vegetation Map Unit Number (MU) and description	Area within the Project application area (ha)
MU 7 Newnes Plateau Narrow-leaved Peppermint - Mountain Gum - Brown Stringybark Layered Forest	2.25
MU 8 Newnes Sheltered Peppermint – Brown Barrel Shrubby Forest	1.45
MU 11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest	1.27
MU 26 Newnes Plateau Narrow-leaved Peppermint - Silver-top Ash Layered Open Forest	3.55
MU 28 Sandstone Plateau and Ridge Scribbly Gum – Silvertop Ash Shrubby Woodland	0.00
MU 29 Sandstone Slopes Sydney Peppermint Shrubby Forest	0.22
MU 33 Tableland Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest	0.85
MU 35 Tableland Gully Mountain Gum – Broad-leaved Peppermint Grassy Forest	0.00
MU 37 Cox's Permian Red Stringybark - Brittle Gum Woodland	6.71
MU 43 Pagoda Rock Sparse Shrubland	0.00
MU 44 Sandstone Plateaux Tea Tree - Dwarf Sheoak - Banksia Rocky Heath	0.00
MU 53 Mountain Hollow Grassy Fen	0.02
MU 58 Acacia Thickets	21.92
MU 59 Non-native Vegetation – Pine Plantation / Woodlot / Shelter	0.01
MU 61 Unclassified	0.13
MU 62 Cleared/disturbed lands	41.73
Total	80.11

Those present which were part of a listed ecological community included:

- MU 11 corresponds to Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions EEC listed under the TSC Act.

- MU 53 corresponds to Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions EEC listed under the TSC Act.

5.2.2 Impact Identification

The biodiversity assessment for the EIS predicted the project would result in 27.84 ha of vegetation disturbance, including impacts on 0.65 ha of NSW listed endangered ecological communities comprising 0.63 ha of HN572 (MU11) and 0.02 ha of HN602 (MU53). The project was also predicted to have the potential to disturb the following threatened flora species detected within the project application area:

- *Caesia parviflora* var. *minor* (Small Pale Grass Lily) (approximately three individuals)
- *Persoonia hindii* (approximately seven individuals)
- Veronica blakelyi (one individual)

The proposed design modifications will not increase the clearing of native vegetation or increase the biodiversity offset requirements for the project. Clearing of native vegetation will remain within the 27.84 ha limit required by the development consent and will be completed in accordance with the approved Biodiversity Management Plan for the project.

Consideration of the potential for biodiversity impacts associated with the relevant design changes in comparison to the approved development is provided in the following sections.

Brine management process

The OPUS system and crystalliser would be located within the overall WTP facility footprint to the south and east of the MPPS operations. The footprint of the new treatment units falls entirely within the project application area, which has been assessed as part of the EIS. There will be no additional vegetation clearance required for implementation of the alternate brine management process as part of the project.

Pond Strategy

Inclusion of the existing MPPS ponds within the water treatment process will require an extension to the project application area presented in the EIS by approximately 10.6 ha. The ponds are existing assets which will be repurposed as part of the project and the proposed extension area is located within the existing MPPS operational footprint. Ground disturbance outside the previous project application area will be limited to trenching for pipeline installation within a highly modified operational environment. There will be no additional clearing of native vegetation associated with the project.

Transfer pipeline hydraulics

The break tank will require disturbance to native vegetation near the top of the escarpment on the Newnes Plateau. The break tank will be located entirely within the disturbance footprint approved for the transfer main included in the EIS. There will be no additional disturbance to native vegetation or additional offset requirements beyond the measures previously included in the EIS.

Pipeline alignment

The pipeline will be installed underground within a directional bore and there would be no physical disturbance to the ground surface outside the project application area assessed as part of the EIS.

The launch and receival pits would be located in previously cleared areas and will not result in additional clearance of native vegetation.

Residuals transfer system

The hydraulic standpipe and ventshaft will be installed entirely within the disturbance footprint assessed within the EIS. The diversion of the residuals pipeline will be restricted to previously disturbed land immediately adjacent to the REA and will not result in additional clearance of native vegetation.

5.3 Heritage

5.3.1 Environmental setting

Detailed investigations were undertaken as part of the EIS (RPSb, 2016) to investigate the potential impacts upon Aboriginal and European cultural heritage values from the development of the project.

The project application area includes areas in close proximity to permanent drinking water such as Wangcol Creek and the Coxs River and shelter in nearby pagodas and cliff faces, which would have been subject to some level of Aboriginal occupation. However, the project application area has been highly modified and there were no Aboriginal sites predicted to be disturbed by the project.

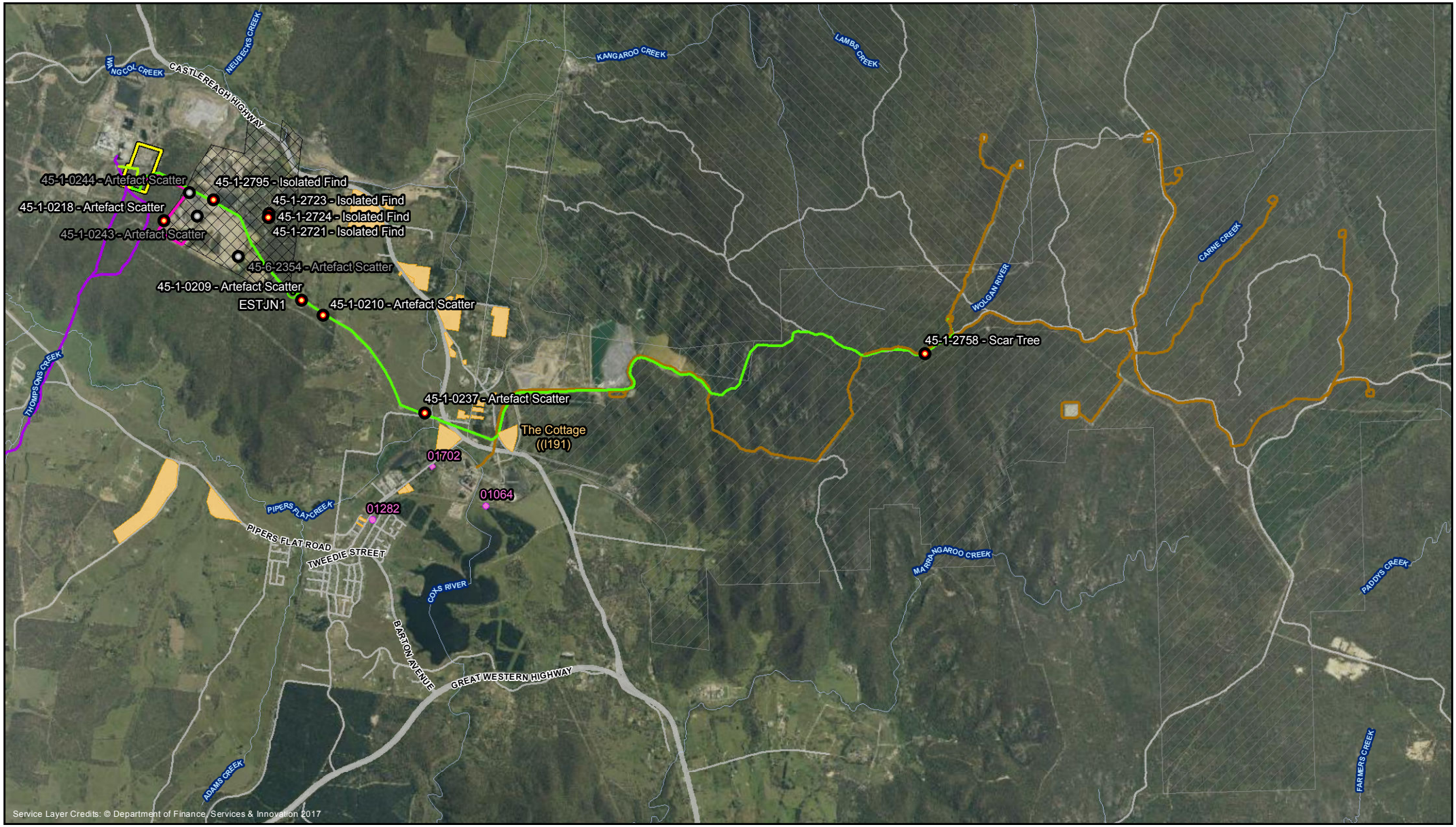
There were no new Aboriginal sites identified during the archaeological surveys undertaken as part of the EIS. There were eleven Aboriginal sites previously recorded within 30 m of the Project application area, seven of which were assessed as being present at the time of EIS publication as shown on Figure 5-1 and Table 5-2. The sites consisted of three artefact scatters, three isolated finds and a scarred tree.

Three of the sites comprised isolated finds (# 45-1-2721, # 45-1-2723, # 45-1-2724) located within 30 metres of the proposed treated water transfer pipeline to Wangcol Creek which no longer forms part of the project.

One previously recorded site comprising two artefacts was recorded on the AHIMS database as being within the central portion of the Project application area near the existing conveyor (AHIMS #45-1-0209). This site was ground-truthed during the preparation of the EIS as being located in a highly modified area and was recommended to be deregistered and the AHIMS database updated with this as 'Not a Site' following final salvage.

Further archaeological investigations and consultation with Registered Aboriginal Parties has been undertaken following the completion of the EIS. The investigations were undertaken in May 2017 by archaeologists from RPS with representatives from the Registered Aboriginal Parties (RAPS) in accordance with Centennial Coal's Western Holdings Aboriginal Cultural Management Plan. The aim of the investigations was to identify the site condition and agree on management procedures for sites located within the Springvale Coal Services site that would not be subject to further disturbance.

Site #45-1-0209 was re-examined as it remained listed on the AHIMS database. The site was originally recorded as comprising two small quartz artefacts located immediately adjacent to the existing conveyer, which were not located during the recent survey. The site is located outside the project application area for the raw water transfer pipeline and the RAPS were satisfied that there was no proposed works in this area and there was no risk of harm to the site.



Paper Size A4

0 500 1,000 2,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

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LEGEND

- Raw water transfer pipeline
- Residuals transfer pipeline
- Cox's River Water Supply Pipeline
- Existing and Approved SDWTS
- Proposed Water Treatment Plant Site
- State Heritage Site
- Local Heritage Site
- Survey Tree
- No Go Zone
- AHIMS Sites (Extant)
- AHIMS Sites (Previously Recorded)

Centennial Coal and EnergyAustralia
EA/CEY Water Treatment Project

Job Number 21-25109
Revision
Date 03 Nov 2017

Aboriginal and Non-Aboriginal Heritage

Figure 5.1

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Data source: General Topo - NSW LPI DTDB 2012, Imagery - Sixmaps 2016. Created by:mking3

Table 5-2 Aboriginal sites and assessed level of significance

Site	Site type	Location	Significance scale	Research Potential	Representativeness	Rarity	Education Potential	Rank (Total Score)	Overall Archaeological Significance
#45-1-0210	Artefact Scatter	Overland conveyor	Local	1	1	1	1	4	Low
			Regional	1	1	1	1	4	Low
#45-1-0218	Artefact Scatter	Residuals transfer pipeline	Local	1	1	1	1	4	Low
			Regional	1	1	1	1	4	Low
#45-1-0237	Artefact Scatter	Overland conveyor	Local	1	1	1	1	4	Low
			Regional	1	1	1	1	4	Low
#45-1-2758	Scarred tree	Newnes Plateau	Local	1	2	1	1	5	Low
			Regional	1	1	1	1	4	Low
#45-1-2721	Isolated find	Treated water transfer pipeline	Local	1	1	1	1	4	Low
			Regional	1	1	1	1	4	Low
#45-1-2723	Isolated find	Treated water transfer pipeline	Local	1	1	1	1	4	Low
			Regional	1	1	1	1	4	Low
#45-1-2724	Isolated find	Treated water transfer pipeline	Local	1	1	1	1	4	Low
			Regional	1	1	1	1	4	Low
#45-1-0209	Artefact scatter	Overland conveyor	Recorded as “Site not valid – not a site” in EIS. Site remains listed on AHIMS database although artefacts were not observed during May 2017 investigations						
#45-1-0243	Artefact scatter	Overland conveyor	Site not valid						
#45-1-0244	Artefact scatter	Overland conveyor	Site not valid - salvaged						
#45-6-2354	Open camp site	Overland conveyor	Site not valid						
AHIMS #45-1-2795	*Isolated find*	*Overland conveyor*	*New site recorded during May 2017 investigations*						

A new site (AHIMS #45-1-2795) was also identified within 30 metres of the project application area and registered on the AHIMS database. The site consists of an isolated artefact comprising a complete quartzite flake approximately 2 cm in length and 1.3 cm in width and located atop of sandy silty soil consisting of gravel and leaf and branch litter adjacent to the existing conveyor within the Springvale Coal Services site. The site is located on the opposite side of the conveyor from the proposed alignment of the raw water transfer pipeline and would not be impacted by the project

Six extant AHIMS sites remain located within 30 metres of the project application area as shown in Table 5-2. The six sites do not include the isolated finds in proximity to the treated water transfer pipeline which has been removed from the project application area and the sites listed as not valid. All sites will continue to be located outside the project application area following the proposed design modifications and will not be impacted by the project.

Consultation with RAPS has also been undertaken as part of the preparation of the draft Cultural Heritage Management Plan for the project in accordance with the conditions of consent for (SSD) 7592. A summary of the consultation undertaken as part of the Western Holdings Cultural Heritage Management Plan and the Springvale Water Treatment Project Draft Cultural Heritage Management Plan in shown in Table 5-3.

Table 5-3 Consultation log for Aboriginal cultural heritage management plans

Date	Method of Consultation	Activity / Discussion
02 May 2017	Site inspections with RAPs	Inspection undertaken as Western Region Aboriginal Cultural Heritage Management Plan, which identified site #45-1-0209 and #45-1-2795
04 May 2017	Online registration of new site	Register site #45-1-2795; BF JN 1 IF - Blackmans Flat IF
27 September 2017	Six monthly meeting with RAPs as per Centennial's Western Region Aboriginal Cultural Heritage Management Plan	Presentation by Veolia on the progress of Springvale Water Treatment Project development and discussions on the Project's draft Aboriginal Cultural Heritage Management Plan provided to the RAPs for their feedback.
03 October 2017	Email	Veolia received feedback on the Aboriginal Cultural Heritage Management Plan from Wellington Valley Wiradjuri Aboriginal Corporation (RAP)
12 October 2017	Email	Veolia provided letter to Wellington Valley Wiradjuri Aboriginal Corporation outlining how the feedback comments had been incorporated into the Aboriginal Cultural Heritage Management Plan. No response received from the RAP.

Two items of local European heritage were also identified in proximity to the project application area: "the Cottage" (I191) and the European Surveyor's Tree (EST JN1). The "Cottage" is identified as having local significance in the Lithgow LEP and does not appear on any other register. The built heritage associated with the item does not extend into the project application area, but the project application area encapsulates a 10 x 10 metre section of the curtilage.

The European Surveyor's Tree, while representing past surveying activity in the region is not unique and there are other examples of this kind of marking elsewhere in the region. It does not meet the heritage criteria for local listing.

5.3.2 Impact identification

The heritage assessment for the EIS predicted the project would minimal impacts upon Aboriginal and non-Aboriginal heritage values in proximity to the project.

Consideration of the potential for heritage impacts associated with the relevant design changes in comparison to the approved development is provided in the following sections.

Brine management process

The footprint of the new OPUS falls entirely within the project application area that has been previously assessed as part of the EIS.

Pond strategy

Inclusion of the existing MPPS ponds within the water treatment process will require an extension to the project application area presented in the EIS by approximately 10.6 ha. The

ponds are existing assets which will be repurposed as part of the project and the proposed extension area is located within the existing MPPS operational footprint.

Ground disturbance outside the previous project application area will be limited to trenching for pipeline installation within a highly modified operational environment and is not anticipated to have potential to impact upon any Aboriginal or European heritage values.

Transfer pipeline hydraulics

The break tank will be installed underground near the top of the escarpment on the Newnes Plateau. The break tank will be located entirely within the disturbance footprint approved for the transfer main included in the EIS. There will be no additional ground disturbance for installation of the tank in comparison to that previously assessed within the EIS.

Pipeline alignment

The pipeline would be installed underground within a directional bore and there would be no physical disturbance to the ground surface outside the project application area assessed as part of the EIS.

The launch and receival pits would be located in previously cleared areas and will not result in disturbance beyond that considered in the EIS. A launch receival pit will be required within an existing haul road in the vicinity of the curtilage of “the Cottage”. The drill site will be rehabilitated following the completion of pipeline installation and is not anticipated to impact upon the conservation values of the listed item.

Residuals transfer system

The hydraulic standpipe and vent shaft will be installed entirely within the disturbance footprint assessed within the EIS and will not result in additional ground disturbance.

The diversion of the residuals pipeline will be restricted to previously disturbed land immediately adjacent to the REA and will provide an additional buffer distance from #45-1-0218 located to the west of the project application area.

5.4 Traffic and transport

5.4.1 Environmental setting

Key roads relevant to the Project include the Castlereagh Highway, Boulder Road, Main Street, Chifley Road, Old Bells Line of Road and State Mine Gully Road/Glowworm Tunnel Road. Other access tracks/roads in the Newnes State Forest include the Mayinygu Marragu Trail, Sunnyside Ridge Road and minor access tracks. Other relevant roads include Brays Lane, Karawatha Drive and the Springvale Coal Services Site access road. Detailed descriptions of the above roads are located in Section 14.2.1 of the EIS.

Table 5-4 provides an overview of the total vehicles using each of the roads currently during the peak periods as detailed in Section 14.2.2 of the EIS. The numbers outlined in Table 5-4 for the Castlereagh Highway and Chifley Road are the numbers for both directions with further detail presented in Chapter 14 of the EIS.

Table 5-4 Summary of vehicle movements

Road	AM Peak Hour (vph)	PM Peak Hour (vph)	Daily* (vpd)
Castlereagh Highway	405	494	5,786
Chifley Road	220	318	3,059
Springvale Mine Access Road	13	88	523
Old Bells Line of Road	12	11	104
Glowworm Tunnel Road	9	12	91
Sunnyside Ridge Road	6	5	39

Table 5-5 provides an overview of percentage of vehicles using each of the impacted roads that are classified as heavy vehicles. Further discussion of these numbers is located in Section 14.2.2 of the EIS.

Table 5-5 Heavy vehicle proportions

Road	LV* %	HV* %
Castlereagh Highway (2015 data)	87%	13%
Chifley Road (Station ID 99037) (2006 data)	98%	2%
Old Bells Line of Road	62%	38%
Glowworm Tunnel Road	68%	32%
Sunnyside Ridge Road	79%	21%

5.4.2 Impact identification

Potential impacts upon the safety or capacity of the local road networks from the proposed design changes is primarily restricted to the increased construction and operational workforce required for the implementation of the project.

Workforce

An overview of the proposed changes to light vehicle numbers for both construction and operation is provided in Table 5-6. Heavy vehicle numbers have been assessed as remaining consistent with the movements predicted in the EIS.

Table 5-6 Summary of changes to light vehicle numbers

Vehicle type	Daily vehicle movements			
	Mine water transfer system		Water treatment plant	
	EIS	Proposed modification	EIS	Proposed modification
Construction	16 (8 in, 8 out)	80 (40 in, 40 out)	50 (25 in, 25 out)	160 (80 in, 80 out)
Operation	N/A	N/A	10 (5 in, 5 out)	44 (22 in, 22 out)

Proposed haulage routes

Table 5-7 provides an overview of the roads which would be used to access particular aspects of the project.

Table 5-7 Site access routes

Site	Light vehicle access	Heavy vehicle access
Mine water transfer system on Newnes Plateau	State Mine Gully Road/Glowworm Tunnel Road via Bridge Street, Tank Street, Macaulay Street, Laidley Street and Atkinson Street from Mort Street. Access then available to Great Western Highway (via Lithgow Street and Main Road) or Chifley Road (via Mort Street).	Chifley Road, Old Bells Line of Road and Glowworm Tunnel Road. Access from the Great Western Highway available via Main Street, Lithgow Street and Mort Street.
Mine water transfer system (west of LDP009 to water treatment plant	Wallerawang Haul Road, Karawatha Drive, Brays Lane and Springvale Coal Services Site Access Road from the Castlereagh Highway.	As per light vehicles.
Water treatment plant site	Boulder Road from the Castlereagh Highway.	As per light vehicles.

Traffic generation

An overview of the proposed changes to light vehicle numbers for each aspect of the project for both construction and operation is presented in Table 5-8. Heavy vehicle numbers are to remain as assessed in the EIS.

Table 5-8 Summary of changes to light vehicle numbers

Vehicle type	Daily vehicle movements			
	Mine water transfer system		Water treatment plant	
	EIS	Proposed modification	EIS	Proposed modification
Construction	16 (8 in, 8 out)	80 (40 in, 40 out)	50 (25 in, 25 out)	160 (80 in, 80 out)
Operation	N/A	N/A	10 (5 in, 5 out)	44 (22 in, 22 out)

Construction impacts

Table 5-9 provides an overview of the increase in traffic volumes resulting from the project. This includes an indication of the percentage increase for each of the assessed roads.

Table 5-9 Expected traffic increase – daily traffic volumes (two-way)

Road	Existing traffic (vpd)	Existing + project traffic (vpd)	Increase in traffic (vpd)	Percentage increase in traffic	Vehicles per day (capacity)
Castlereagh Highway	5,786	5,966	180	3%	50,000+
Castlereagh Highway*#	5,786	6,006	220	4%	50,000+
Chifley Road	3,059	3,075	16	0.5%	10,000 – 20,000
Old Bells Line of Road	104	120	16	15%	500 – 4,000
Glowworm Tunnel Road#	91	147	56	61.5%	500 – 4,000
Sunnyside Ridge Road#	39	95	56	167%	500 – 4,000

**This scenario takes into account the worst case assessment for Castlereagh Highway, with construction vehicles associated with water treatment plant and the pipeline installation west of LDP009.*
 # An assumption has been made that only half of the mine water transfer system workers would be using each route due to multiple work fronts.

The proposed modifications would result in an increase in the daily traffic along the Castlereagh Highway and Chifley Road, which represents an increase of up to 4% on existing numbers. This increase is not expected to result in any impacts on the operational capacity of any of the assessed roads due to adequate additional capacity on these roads.

Impacts on smaller roads within the Newnes State Forest would see larger proportional increases in the number of vehicles using the roads as a result of the existing low traffic volumes within the state forests. The proposed modifications have the potential to increase the number of vehicles along some roads, including by up to a 166% increase at Sunnyside Ridge Road. Though the increase in the number of vehicles is high in comparison to existing volumes, the operation of these roads is still considerably within the operational capacity of these roads.

A summary of the impacts during the AM and PM peak hours is provided in Table 5-10 and Table 5-11. The results show that while the proposed modifications would result in more vehicles using the roads assessed compared to the EIS, all relevant roads are considered to have adequate spare capacity to accommodate the increase. The increase in vehicles is not considered to result in any impacts on the capacity or safety of the road network during the AM and PM peaks.

Table 5-10 Expected traffic increase – AM peak hour volumes (two-way)

Road	Existing traffic (vph)	Existing + Project traffic (vph)	Increase in traffic (vph)	Percentage increase in traffic	Capacity (vph) (total)
Castlereagh Highway	405	489	84	21%	3,200
Castlereagh Highway*#	405	511	106	26%	3,200
Chifley Road	221	223	2	1%	1,800
Old Bells Line of Road	12	14	2	16.5%	1,000
Glowworm Tunnel Road#	9	31	22	244%	1,000
Sunnyside Ridge Road#	6	28	22	366%	1,000

**This scenario takes into account the worst case assessment for Castlereagh Highway, with construction vehicles associated with water treatment plant and the pipeline installation near LDP009.*
 # An assumption has been made that only half of the mine water transfer system workers would be using each route due to multiple work fronts.

Table 5-11 Expected traffic increase – PM peak hour volumes (two-way)

Road	Existing Traffic (vph)	Existing + proposal Traffic (vph)	Increase in Traffic (vph)	Percentage Increase in Traffic	Capacity (vph) (total)
Castlereagh Highway	674	758	84	12.5%	3,200
Castlereagh Highway*#	674	780	106	16%	3,200
Chifley Road	194	196	2	1%	1,800
Old Bells Line of Road	11	13	2	15%	1,000
Glowworm Tunnel Road#	12	34	22	183%	1,000
Sunnyside Ridge Road#	5	27	22	440%	1,000

**This scenario takes into account the worst case assessment for Castlereagh Highway, with construction vehicles associated with water treatment plant and the pipeline installation near LDP009.*

 # An assumption has been made that only half of the mine water transfer system workers would be using each route due to multiple work fronts.

Operation

The proposed modifications would result in an increase in the number of vehicles accessing the water treatment plant site due to operational workers. The introduction of up to 22 vehicles during each peak is not considered to result in any impacts on the operation of the Castlereagh Highway or Boulder Road due to adequate capacity on these roads.

5.5 Other environmental matters

The following environmental outcomes are anticipated to have negligible or positive outcomes in comparison to the approved project.

5.5.1 Aquatic ecology

The proposed design modifications will not alter the water quality outcomes achieved for the project or the overall benefit for the catchment. Adoption of directional drilling beneath the Coxs River will remove the potential for impacts to in-stream conditions and associated risks to aquatic ecology.

The proposed modifications will not result in any increased risk to aquatic ecology beyond what has been considered in the EIS.

5.5.2 Noise and vibration

The revised pond strategy will require pumps to return water from the buffer storage to the water treatment plant. The pumps will not represent a major noise source that has potential to contribute to noise emissions from the overall MPPS operations.

The potential for directional drilling beneath the Coxs River was included in the construction noise model undertaken for the EIS. Construction of the modified raw water transfer main alignment is anticipated to result in equivalent noise emissions predicted in the EIS.

The increase in vehicle movements associated with the construction and operational workforce is anticipated to have negligible impact upon existing road traffic noise on the local road network.

5.5.3 Air quality

The revised pond strategy will reduce the overall volume of earthworks required during construction of the WTP and therefore reduce the potential for dust emissions during dry and windy conditions.

5.5.4 Greenhouse

The OPUS system is considered to be a more sustainable option with a considerable reduction in the required chemical dosing and energy consumption in comparison to the brine concentrators. Annual power consumption has been estimated to reduce from around 25 to 5 GWh/year for the operation of the brine management system. This would considerably reduce the greenhouse footprint associated with the project.

The proposed change to the pond storage strategy also provides energy saving in pumping costs by allowing mine water from the transfer pipeline to be passed directly to the treatment units and limits the volume of treated water required to be pumped to Thompsons Creek Reservoir.

5.5.5 Visual

The OPUS system and crystalliser will be integrated within the WTP resulting in a more consolidated and compact infrastructure footprint.

The hydraulic break tank and modified transfer pipeline alignment will be installed beneath the surface of the ground and will not result in ongoing visual impacts. The tank will be located adjacent to an existing transmission line easement and more than 500 metres away from the pagoda rock formations known as the Clerestory Spurs.

The hydraulic standpipe and vent shaft on the residuals transfer system will be visually integrated with the existing conveyor and other mining and power generation infrastructure. The proposed location is not considered to be visually sensitive and will be predominantly shielded from view by surrounding mature vegetation.

5.5.6 Waste

The OPUS system produces a mixed salt and a dewatered lime salt which both have potential for beneficial reuse applications. These will continue to be investigated during the implementation of the project to reduce overall waste volumes.

5.5.7 Socio-economic

The additional workforce required during construction and operation will provide increased opportunities for local employment and economic stimulus for the region.

6. Conclusion

Springvale Coal is seeking a modification to SSD 7592 in accordance with Section 96(1A) of the EP&A Act to facilitate a number of minor design changes to the approved project description. The design changes will improve the operational efficiency and reduce the risk profile of the project.

The proposed minor design changes in the modification include an amended brine management process, a change to the pond strategy, additional hydraulic controls and minor changes to the pipeline alignments and an increase in the estimated peak construction workforce.

To evaluate the impacts of the proposed modification, an assessment of potential impacts was undertaken for the project. The potential impacts are considered consistent with those described in the EIS and Amendment to the Development Application.

Given the minor nature of the proposed modifications, it is considered that the modification is consistent with the original development consent. The environmental impacts from the modification are negligible to minor and it is considered appropriate that the modification be considered under Section 96(1A) of the EP&A Act.

7. References

DEC (2006a), *The Vegetation of the Western Blue Mountains*. Unpublished report funded by the Hawkesbury – Nepean Catchment Management Authority. Department of Environment and Conservation. Hurstville

RPS (2016a), *Biodiversity Assessment Report: Springvale Water Treatment Project*

RPS (2016b), *Cultural Heritage Impact Assessment: Springvale Coal Mine Water Transfer Pipeline*

RPS (2017a) WCS Archaeological Inspection Report

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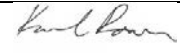
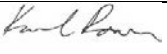
0	A.Montgomery	K. Rosen		K. Rosen		10/11/17

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